Math 8
Fall 2019

Preliminary Homework
Assigned Monday, September 23

Note: Preliminary homework is always graded credit or no credit. **You get full credit for completing the assignment, whether or not your answers are correct, as long as your work shows you have thought about the problem.** The purpose of preliminary homework is to start you thinking about the topic of the next class.

You may use your preliminary homework for in-class activities with your classmates. You should be sure to think about these questions so you will be prepared.

Preliminary homework is always due at the *beginning* of the next class.

1. Evaluate $\int \sin^3(x)\cos^2(x)\,dx$ by rewriting $\sin^3(x)$ as $\sin^2(x)\cdot\sin(x)$, replacing $\sin^2(x)$ in that expression with $(1-\cos^2(x))$, then making an appropriate u-substitution.

2. You may recall the trigonometric identity

$$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta).$$

(This follows from the identity for the cosine of the sum of two angles.) We can do a little manipulation to come up with a new identity:

$$\cos(2\theta) = \cos^2(\theta) - (1 - \cos^2(\theta)).$$

$$\cos(2\theta) = 2\cos^2(\theta) - 1.$$

$$\cos^2(\theta) = \frac{\cos(2\theta)+1}{2}.$$

Use these facts to evaluate $\displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \cos^2(x)\,dx$.

3. Use problem 2 to evaluate $\displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2(x)\,dx$.